

Abstract

The task of the present invention is to enable formation of a gate insulating film structure having a good-quality interface between a silicon oxide film and silicon in an interface between a high dielectric constant thin film and a silicon substrate to provide a semiconductor device and a semiconductor manufacturing method which are capable of improving interface electrical characteristics, which has been a longstanding task in practical use of a high dielectric constant insulating film. A metal layer deposition process and a heat treatment process which supply metal elements constituting a high dielectric constant film on a surface of a base silicon oxide film 103 allow the metal elements to be diffused into the base silicon oxide film 103 to thereby form an insulating film structure 105 as a gate insulating film, after forming the base silicon oxide film 103 on a surface of a silicon substrate 101. The insulating film structure 105 including a silicate region comprises a silicon oxide film region, a silicate region, and a metal rich region, forming a silicate structure having composition modulation in which composition of metal increases as closer to an upper portion, and the composition of silicon increases as closer to a lower portion.